DIGITAL PERSUASION AT THE ZERO MOMENT OF TRUTH STAGE: AI-MEDIATED RELATIONAL COMMUNICATION AND THE ROLE OF BEHAVIOURAL HEURISTICS IN THE S-O-R MODEL

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Abstract

The evolution of digital commerce has profoundly altered the way consumers interact with brands and make purchasing decisions. Although the use of algorithmic tools has become the norm in the market, how digital stimuli influence consumers' cognitive processes and behavioural responses in the pre-purchase phases remains insufficiently explored. Based on the principles of behavioural economics, this paper addresses this gap by integrating artificial intelligence (AI)-mediated relational communication into the Stimulus-Organism-Response (S-O-R) model, thus extending the applicability of the Zero Moment of Truth (ZMOT) stage in digital ecosystems. Conceptually, the proposed model argues that AI-mediated personalization and choice architecture act as algorithmic stimuli. They cause fluctuations in internal cognitive and affective states, which, in turn, direct behavioural outcomes. The five theoretical sentences developed detail the interaction of these variables, while highlighting the role of negative moderators, such as trigger fatigue and digital literacy. In analytical terms, the study recommends a transition from maximizing short-term transactional conversions to building sustainable trust capital. The development of transparent practices and the design of interfaces for cognitive ease can neutralize psychological reactance, while limiting the use of dark patterns.

Keywords: *ZMOT, S-O-R model, artificial intelligence, behavioural heuristics, choice architecture, decision fatigue, personalization paradox*.

1. INTRODUCTION

The rapid advancement of data-driven technologies has profoundly transformed the retail landscape and marketing communication architecture. This transformation calls into question the classical economic paradigm of *homo economicus*, which postulates a perfectly rational actor dedicated exclusively to maximizing utility through rigorous cost-benefit assessments. On this basis, platform ecosystems generate an informational overload that limits the processing capacity of buyers, causing them to manifest a bounded *rationality*. In this competitive environment, decision-making dependence on behavioural heuristics increases significantly, favouring mental shortcuts that facilitate decision-making with little effort (Kakaria et al., 2023). Convergently, emotional contagion, cognitive biases, and *algorithmic persuasion* techniques come to structurally shape evaluations and purchasing behaviours.

From this perspective, the ZMOT stage acquires a central decision-making weight. As initially theorized, ZMOT defines the pre-purchase phase in which emancipated consumers actively research products and evaluate alternatives in the digital space, before engaging in a transaction. The search fingerprints left at this stage reshape the architecture of consumption (Ghose et al., 2019), but expose users to AI-powered markets that are often strategically designed in order to exploit cognitive vulnerabilities. Thus, to orchestrate the hyper-personalization of offers, marketers implement AI-mediated relational communication (Muharam, 2024). This tactic is frequently doubled by a coercive choice architecture, manifested by deficit indices or reverse timers, which aim to short-circuit the consumer's logical deliberation (Ali et al., 2025).

Despite the normalisation of these digital interventions, there is still a critical need to structure an explanatory framework capable of elucidating how AI-based stimuli are grafted onto consumers' psychological processes. To respond to this goal, the present paper applies the S-O-R model, initially proposed by Mehrabian and Russell (1974) and later adapted for

commercial contexts by Jacoby (2002). Within this framework, the study conceptualizes AI-mediated relational communication and the architecture of choice as external environmental stimuli (S). Further, the paper theorizes their impact on the states of the organism (O), represented here by internal processes such as trust capital, psychological assumption, cognitive load and perceived vulnerability. Subsequently, the model maps how these latent states influence behavioural (R) responses, such as impulse buying and brand resonance.

By integrating these areas, the present paper makes four explicit contributions to the marketing literature. Firstly, it assimilates AI-mediated relational communication into the S-O-R architecture. Secondly, it extends the applicability of ZMOT to contemporary fully automated commerce environments. Thirdly, it clearly delineates internal behavioural heuristics from the external impulses associated with the architecture of choice. Finally, it introduces trigger fatigue as a moderating variable that constrains the effectiveness of these manipulative mechanisms. Taken together, these elements reconceptualize algorithmic persuasion, shifting the focus from isolated tactics to a succession of structured environmental stimuli that condition the digital consumer's decision.

2. LITERATURE REVIEW

2.1 Fundamental theory (S-O-R model)

The literature suggests that the theoretical models derived from environmental psychology provide a robust reading grid for examining behaviour in virtual space. In the initial formulation proposed by Mehrabian and Russell (1974), the S-O-R model describes how environmental stimuli influence the individual's internal emotional and cognitive states, subsequently causing closeness or avoidance reactions. Jacoby (2002) reinforced this paradigm in marketing, demonstrating that individuals do not react mechanically to external market cues, but rely on internal psychological processing as the mediating instance of all decisions. These mechanisms have been analysed in numerous studies, which converge in highlighting the role of algorithmic signals in shaping the perception of risk and trust (Akoğlu, 2025; Gulfraz et al., 2022). Thus, the quality of virtual experiences proves to be essential in calibrating the transition from the stimulation phase to the formulation of the final behavioural response.

2.2 ZMOT theory

ZMOT marks the distancing from the traditional linear model, which placed the Moment of Truth exclusively in front of the physical shelf. Today, buyers perform extensive valuations by extracting data from multiple platforms before completing the transaction, a phenomenon that significantly reduces the information asymmetry inherent in online marketplaces. For example, Ghose et al. (2019) demonstrate that search fingerprints fundamentally alter information costs and profoundly reshape preferential hierarchies. Convergently, further research, such as that of Rajender and Reddy (2025), validates the deep link between the quality of interactions in the ZMOT phase and long-term brand performance. Due to its role as a decision-making anchor, optimized management of the ZMOT stage has become an essential prerequisite for audience conversion, an effort increasingly mediated by conversational systems.

2.3 AI-mediated relational communication

Firms are integrating AI-mediated relational communication as the primary mechanism for interaction in digital markets. This implementation of the concept of *intimate automation*, the set of systems designed to maintain continuous personalized connections with users, acts as a powerful environmental stimulus. A critical decision-making variable in this design is the calibration of communication style. For example, Cai et al. (2024) highlight the ability of socially oriented communication styles, focused on informal dialogue and support, in order to mitigate negative evaluations, while Cheng et al. (2022) demonstrate that emotional support elements amplify overall technological acceptance.

The perception of empathic warmth functions as a primary psychological mediator (Cai et al., 2024), and its simulation frequently leads to

increased trust of virtual assistants (Xu et al., 2022). This simulation is often achieved through verbal *embodiment strategies*, which include reciprocal word takeover and semantic validation. These tactics reinforce the perceived human character of the interface and generate a superior sense for *brand intimacy*, a variable strongly correlated with commercial devotion (Bergner et al., 2023).

However, hyper-personalization comes at a substantial cost in the privacy sphere (Aguirre et al., 2015). Conceptually, the *personalization paradox* captures the tension between the usefulness of relevant content and the feeling of surveillance induced by the algorithmic process of collecting personal data (Dwivedi et al., 2021). When individuals become aware of the lack of transparency of these practices, the threshold of accepted intrusion is crossed. This revelation quickly induces a perceived vulnerability that negates the advantages of the system, triggering psychological reactance and eroding trust capital (Handoyo, 2024).

2.4 Behavioural heuristics and the architecture of choice

Alongside verbal interaction, automated ecosystems operate psychological persuasion tools in order to accelerate the completion of purchases. The analysis requires the theoretical distinction between behavioural heuristics, intrinsic mental shortcuts, and the architecture of choice, the extrinsic design meant to trigger those shortcuts.

As Gigerenzer and Gaissmaier (2011) explain, users relate to information overabundance by adopting the posture of "*cognitive miser*," a mechanism for conserving mental energy that favours rapid evaluations.

For example, Ali et al. (2025) document the effectiveness of scarcity indices and emergency triggers in generating impulse purchases based on loss aversion (FOMO), while Muharam (2024) draws attention to the limits of human processing. The imposition of artificial constraints blocks systematic deliberation, inducing a cognitive overload that forces the consumer to rely on the simple visual heuristic signal.

In analytical terms, Roreng and Halik (2025) analyse the installation of the phenomenon of trigger fatigue. This variable functions as a fundamental limit condition, indicating the formation of acute scepticism following the systematic exposure to misleading reverse stopwatches. Cognitive saturation ultimately leads to the rejection of choice architecture by audiences with mature digital literacy.

3. CONCEPTUAL FRAMEWORK AND SENTENCES

Based on the synthesis of the literature, the next section advances an explanatory theoretical model. Relationships postulate AI-mediated relational communication and choice architecture as external stimuli (S). These factors modulate internal psychological and affective states (O) — such as feelings of warmth, cognitive load, trust, and perceived vulnerability. These internal processes mediate, in turn, the final behavioural responses (R), visible in the purchase intention or, on the contrary, in psychological reactance.

3.1 AI-mediated relational communication, trust and brand intimacy

The implementation of a socially oriented language directly alters the affective landscape of the body by stimulating the perception of warmth and humanity (Murtaza et al., 2024). By using convincing verbal embedding strategies, algorithmic systems manage to blur the mechanical rigidity of the digital environment (Bergner et al., 2023). From this perspective, the conversational mechanism mitigates informational asymmetry and cements brand intimacy (Akoğlu, 2025).

- **Sentence 1:** AI-mediated socially oriented communication and verbal incorporation strategies (Stimuli) can help increase the perception of warmth and confidence (Organism), thereby increasing the likelihood of purchase intent (Response).

3.2 The paradox of personalization and perceived vulnerability

The effect called the paradox of personalization is activated when consumers deduce the real extent of the data extractions that underlie the interface (Aguirre et al., 2015). When the comfort threshold is exceeded, the feeling of deprivation

of control triggers severe defensive reactions (Handoyo, 2024). On this basis, defense mechanisms undermine the architecture of commercial personalization.

- **Sentence 2:** AI-mediated non-transparent hyper-personalization (Stimulus) can induce a state of perceived vulnerability and psychological reactance (Organism), consequently diminishing the likelihood of long-term engagement with the brand (Response).

3.3 Choice architecture and cognitive overload

The virtual environment instruments quantitative restrictions and time pressures to achieve an immediate conversion (Ali et al., 2025). Under the siege of artificial decision-making stimuli, consumers risk a pronounced depletion of mental resources, ceding logical control in favour of heuristic reactions (Kakaria et al., 2023; Muharam, 2024).

- **Sentence 3:** External elements specific to the architecture of choice, such as indicators of deficit and urgency (Stimuli), can trigger severe cognitive overload and decision-making fatigue (Organism), thus increasing the likelihood of impulsive buying behaviour, characterized by reduced analytical effort (Response).

3.4 The mediating role of the Body

Digital stimuli do not dictate financial success through absolute determinism. Conceptually, consolidated internal states play the role of a primary filter and mediating mechanism in the assimilation of the marketing message (Akoğlu, 2025).

- **Proposition 4:** AI-mediated positive digital interactions (Stimuli) can help strengthen essential internal states, such as trust capital and psychological ownership (Organism), which function as mediating mechanisms in facilitating final purchasing decisions (Response).

3.5 Limit conditions: Trigger fatigue

Chronic exposure to artificial coercion degrades the effectiveness of persuasion in the long term, stimulating sceptical cognitive immunity (Ali et al., 2025; Roreng and Halik, 2025).

- **Sentence 5:** The architecture of coercive choice (Stimulus) can generate scepticism and psychological reactance (Organism), significantly reducing the incidence of impulsive acquisitions (Response). At the same time, this logical relationship could be negatively moderated by factors such as trigger fatigue, digital literacy and individual level of self-control.

4. DISCUSSIONS AND MANAGERIAL IMPLICATIONS

The theoretical propositions formulated within the S-O-R model emphasize the fact that algorithmic strategies and interface design (Stimuli) do not influence purchases directly, but operate exclusively by mediating the internal states of the consumer (the Organism).

From this perspective, the managerial implications suggest that technical transparency and design ethics go beyond the status of mere normative aspirations, representing the core of competitive advantage.

As shoppers with limited rationality are heavily exposed to the cognitive triggers associated with ZMOT, business decision-makers must ensure digital governance that optimizes user effort and preserves brand trust.

4.1 Beyond the transaction, towards the relationship

On this basis, the goal of digital ecosystems should not be limited exclusively to extracting immediate transactional value, but prioritize the cultivation of lasting relationships (Handoyo, 2024). For example, Ghose et al. (2019) indicate that transparent hyper-personalization, geared towards reducing the consumer's mental load, generates superior returns in the long run, making navigation fluency a fundamental strategic imperative.

A key responsibility of managers thus becomes to ensure fluid information experiences that validate the customer's expectations during the pre-purchase phases.

4.2 Strategic Design for Cognitive Ease

Convergently, the concept of cognitive overload demonstrates that the burden felt by a consumer in the virtual environment must be drastically limited. Cai et al. (2024) illustrate how the substitution of mechanical transactional assistants with systems capable of articulating verbal incorporation strategies exponentially increases the perception of human warmth. This phenomenon relaxes the mental effort made to decrypt information and accelerates the development of brand privacy, further favoured by the coherence of the interactive flow (Bergner et al., 2023).

In analytical terms, system architects should design algorithmic interfaces that privilege cognitive ease at the expense of coercive intensification of heuristic pressure.

4.3 Trust capital as strategic protection

In a space defined by severe information asymmetry, trust capital is the most valuable corporate asset a company can mobilize.

Letting go of artificial short-term pressures allows for genuine reputational consolidation.

As audiences acquire advanced digital literacy, the level of rejection of manipulation increases (Roreng & Halik, 2025).

Therefore, companies that demonstrate transparent interface governance manage to attract consumers exhausted by forced decisions, ensuring a commercial resonance of endurance.

5. ETHICAL IMPLICATIONS AND CONCLUSION

5.1 Threat of dark patterns

The methodical exploitation of behavioural heuristics entails severe ethical risks.

If we translate these practices into the logic of the S-O-R model, the manipulative architecture expressed through *dark patterns* functions as an adverse environmental stimulus.

Subjects who experience such systems often experience acute discomfort that directly undermines their decision-making independence (Aguirre et al., 2015).

At the structural level, artificial pressure grinds the consumer relationship and installs a deep psychological reactance (Muharam, 2024).

Cyclic exposure to these stimuli reinforces trigger fatigue (Ali et al., 2025), with the ultimate consequence of alienating the customer base.

5.2 Balanced disclosure and the paradox of personalization

The primary prevention mechanism against the feeling of perceived vulnerability is the clarity of consent. The lack of balanced disclosure when implementing intimate automation systems will invariably trigger the paradox of personalization (Handoyo, 2024).

In analytical terms, developing a transparent policy on the use of data prevents the feeling of intrusion (Dwivedi et al., 2021).

By responsibly addressing this framework, platforms can preserve the accuracy of algorithmic models while respecting the decision-making autonomy of each individual in the digital ecosystem (Aguirre et al., 2015).

5.3 Conclusions

By integrating the concepts of ZMOT, S-O-R and AI-mediated relational communication, the study proposes an integrated perspective on how algorithmic persuasion shapes consumer decision-making in digital environments.

By delimiting the internal heuristic shortcuts from the external instrumentation of the architecture of choice, the paper demonstrates that the contemporary commercial path can no longer be validated strictly from a transactional angle.

The development of trust capital, the reduction of cognitive effort and the affective calibration of interfaces dictate performance in the ZMOT phase.

From this perspective, the shift from maximizing short-term conversions, specific to coercive logic, to ethical governance strategies is imperative.

The analyses highlight that blurring the line between useful digital assistance and invasive marketing generates decision-making fatigue, which requires the implementation of transparent architectures.

As this theoretical approach is conceptual, future efforts should be directed towards an

empirical validation of these mediating mechanisms.

Experimental research can punctually assess variations in the level of psychological reactance associated with various forms of choice architecture, measuring, in a complementary way, the ability of digital literacy to protect the consumer against algorithmic manipulation.

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